

Claim 83. (New) A method as defined in Claim 65, wherein at least one of the recessed notches of the outer periphery has sharp edges.

Claim 84. (New) A method as defined in Claim 70, wherein at least one of the notches recessed from the outer periphery has sharp edges.

Claim 85. (New) A method as defined in Claim 76, wherein at least one of the recessed notches on the outer periphery has sharp edges.

### **REMARKS**

#### 35 U.S.C. §103(a) Rejection – Kramer in view of Fulton:

Claims 59, 61 – 67, and 69 – 81 were rejected under the provisions of 35 U.S.C. § 103(a), as allegedly being unpatentable over Kramer (US 4,615,796) in view of “CE Refresher: Catalyst Engineering, Part 2” by John Fulton (hereinafter “Fulton”).

The Examiner indicated that Kramer discloses a method of fluid distribution in a chemical reactor comprising the steps of providing a layer of a plurality of ceramic filter units, contacting an organic-based stream with the layer of the plurality of ceramic filter units, and passing the organic-based stream through the layer prior to the organic-based feed stream contacting a catalyst bed in the chemical reactor.

#### Response to § 103(a) Rejection:

It is submitted that the combination of Kramer and Fulton does not show, teach or make obvious the subject matter of the claims as presented herein.

In particular, independent claim 67 of the present invention describes a ceramic filter unit with a body having a substantially polygonal outer peripheral shape. Examples of polygonal shapes include triangles (FIG. 6), quadrilaterals (FIG. 7), pentagons (FIG. 8), hexagons (FIG. 9), heptagons (FIG. 10), octagons (FIG. 11) and squares (FIG. 13). Further, dependent claim 64 describes a ceramic filter unit with a fluted outer peripheral surface (FIG. 5), and dependent

claims 65, 70 and 76 describe ceramic filter units with outer peripheries having a plurality of recessed notches. (FIG. 16).

A common feature of these polygonal shaped units and units with fluted surfaces or recessed notches of the present invention is that they each have sharp corners or edges on the outer peripheries of the unit surface. Newly added claims 82-85 specifically recite this feature of sharp edges. This feature is shown in the present application in the filter units of FIGS. 5-11, 13 and 16.

Fulton teaches, however, that sharp corners are a disadvantageous feature and should be "eliminated" as a potential shape option. (see page 97, ¶ 3). Fulton teaches that sharp corners would crumble in service, and the resulting dust and fragments would plug the bed spaces between pellets and cause premature buildup in bed pressure drop. (see page 97, ¶ 3).

Thus, Fulton teaches away from the use of sharp corners or edges on the outer peripheries of supported catalyst. Applicant respectfully submits that it would not be obvious to one skilled in the art to utilize the sharply cornered shapes shown in Figure 1 of Fulton in the design of the ceramic filter units shown in Kramer, as there is no suggestion or motivation to combine the references. As such, Applicant respectfully submits that its present claims 64, 65 and 67 and their dependent claims, as well as newly added claims 82 - 85, relating to this particular feature are nonobvious and patentably distinct.

In addition to the arguments presented above, Applicant maintains and resubmits the following arguments, which were previously presented in similar, but not identical, form in Applicant's office action response dated November 5, 2003.

#### Fluid Distribution is Not Filtering

Applicant respectfully submits that Kramer does not disclose a method of *fluid distribution*, but rather a method of *filtering*. As described in col. 3, lines 8 – 15, Kramer teaches the removal of suspended solids, preferably iron sulfide, of greater than 10 microns in diameter from mixed phase gas-liquid-solid streams. Kramer is tailored to correcting a specific problem in the petroleum processing industry, namely removal of materials similar to iron sulfide. No

mention is made in the Kramer disclosure of fluid distribution. Fluid distribution is not the same or equivalent to filtering.

Applicant also respectfully submits that Kramer also does not disclose the step of “subdividing the organic-based feed stream into a plurality of smaller fluid streams by passing the organic-based feed stream through the plurality of fluid flow passageways”. An embodiment of Applicant’s invention involves the use of ceramic filter units with openings, wherein the particular fluid in the reactor may not only pass around a unit in the layer, but also through at least some of the ceramic filter units by using the plurality of fluid flow passageways created by the openings in at least some of the ceramic filter units.

### Shapes of the Units

Although Kramer does explain that alternative shaped units can be used (col. 4, lines 1 – 4), with spheres being the preferred shape, there is no suggestion that a ceramic filter unit with openings, specifically three or more passages surrounding a central passage, can be used. Applicant's claims 59, 67, and 78 require that the surrounding openings have an elliptical shape. Kramer repeatedly indicated that a sphere was the unit of choice. Every example given in Kramer illustrated the use of a sphere without any openings. More specifically, Examples 1, 2, and 3 in Kramer exclusively uses spheres as the filtering medium.

An important aspect of an embodiment of the present invention is to uniformly distribute the organic-based feed stream across a catalyst bed to prevent channeling and other deleterious consequences by passing the stream through openings in the units. The spherical units disclosed within Kramer would not provide the required flow through at least some of the units.

### Declaration of Inventor

Applicant's use of the ceramic units of the present invention unexpectedly results in advantageous fluid distribution properties, such as improved horizontal fluid distribution and significantly decreased pressure drop across a filter bed. To support these assertions, Applicant has submitted the attached declaration of John N. Glover (hereinafter referred to as the "Declaration"). Mr. Glover has substantial experience in the ceramic and catalyst industries and has participated in experiments resulting in unexpected and surprising, advantageous fluid distribution properties. The Declaration also provides evidence of the commercial success of these ceramic units, which is indicative of the fact that the claimed ceramic filter units of the present invention should be deemed to have met a long felt, unfilled need in the petroleum refining and petrochemical industries. Applicant has performed experiments comparing the ceramic filter units of the present invention with prior art ceramic units that are structurally similar to ceramic units, such as those found in Fulton and Kramer.

It should be noted that according to the Applicant, to the best of his knowledge, the Fulton Ceramic Unit was not commercially available at the time of the experiments and thus

could not be tested. (see page 2, ¶ 7). A similar commercially available unit ("Product C") was instead utilized. *Id.*

Several measurements were taken during the experiments to help determine the amount of lateral fluid distribution that was achieved using several different ceramic units. Table I summarizes the results of each experiment. The best results are indicated by boxed numbers. Five prior art ceramic units (Products A, B, C, D, and E) were compared to three ceramic units made in accordance with the present invention (Products F, G, and H). The prior art ceramic unit results are shaded in gray in Table I and the results for the ceramic units made in accordance with the present invention are non-shaded and located on the right side of Table I. Descriptions of the Products tested can be found in Paragraphs 5 – 10 of the Declaration and in Table I in row labeled as "Product". Samples of the two best performing prior art ceramic units, Products C and E, were included in Applicant's response dated November 5, 2003. Samples of the two best performing ceramic units made in accordance with the present invention, Products F and H, were also included in Applicant's above indicated response.

A detailed description of the experiments that were performed and the apparatus is included in the Declaration in paragraphs 11 – 23. The ceramic units of the present invention performed significantly better than the prior art units similar to those shown in Fulton and Kramer. The experiments showed that there was a substantial increase in the lateral distribution using the ceramic units of the present invention as opposed to the ceramic units with the shapes similar to those shown in Fulton and Kramer.

As described in paragraphs 24 – 25 of the Declaration appended hereto, the ceramic units made in accordance with the present invention performed significantly better than the prior art ceramic units consistently through each experiment that was performed. The experiments illustrate the unexpected results obtained by using the present invention as opposed to the prior art ceramic units. The ceramic units made in the accordance with the present invention provided more lateral distribution for fluid than the prior art ceramic units did.

Claims 59, 66 – 67, and 77 – 78 recite the use of elliptical openings. Support in the specification for the amendments can be found in FIGS. 4, 5, and 12 of the specification. Neither

of the references taken alone or in combination with each other describe a ceramic unit with a central opening and three or more elliptical openings.

Use of elliptical openings also provides an additional design parameter to specify when designing the ceramic units to maximize the amount of material that is allowed to pass through the body of the ceramic unit. For instance, when a circular shape is used for the surrounding openings, as in the Fulton Ceramic Unit, the design parameters that can be changed include the unit diameter, the unit length, the central opening diameter, the number of outer openings, the location of the center of the outer openings, and the diameters of the outer openings. If elliptical outer openings are used, the design parameters that can be changed include the unit diameter, the unit length, the central opening diameter, the number of outer openings, the location of the center of the outer openings, the major axis of the elliptical openings, and the minor axis of the elliptical openings. Using elliptical openings, along with the central opening, provides better control of the amount of fluid distribution and filtering provided by the ceramic units. This allows manufacturers to better customize the ceramics for each application. If more lateral distribution is required in a particular application, then the manufacturers have an additional parameter to optimize to improve lateral distribution.

In addition to the unexpected results obtained by the ceramic units of the present invention, the Assignee of Applicant has enjoyed substantial commercial success from the sale of the ceramic units of the present invention, as described in Paragraph 26 of the appended Declaration. In the period from 1998 to the execution of the Declaration in 2003, Applicant's Assignee sold more than eight million dollars worth of ceramic units, which correlates to approximately 40,000 cubic feet of unit sold. At the time, the ceramic units of the present invention were the number two selling ceramic units with approximately 30% - 35% of the market. The commercial success of the ceramic units made in accordance with the present invention should be considered indicative of the fact that the ceramic units have met a long felt, unfilled need in the ceramic filter industry.

As indicated previously, neither Kramer nor the combination of Kramer and Fulton disclose the present invention. The Federal Circuit noted in *In re Fritch* that:

Under Section 103, teachings of references can be combined only if there is some suggestion or incentive to do so. Although couched in terms of combining teachings found in the prior art, the same inquiry must be carried out in the context of a purported obvious "modification" of the prior art. The mere fact that the prior art may be modified in the manner suggested by the Examiner does not make the modification obvious unless the prior art suggested the desirability of the modification. 23 U.S.P.Q. 2d 1780, 1784 (Fed. Cir. 1992).

Neither Kramer nor any of the other prior art cited suggest the desirability of combining Kramer with Fulton to accomplish Applicant's invention. Even if these references were combined, they would not disclose each element of claims 59, 67, or 78.

Applicant respectfully submits that neither Kramer nor the combination of Kramer and Fulton teaches each required element of claims 59, 67, and 78. There is no suggestion to combine the references, and even if there were, the combination does not disclose the present invention. Applicant respectfully submits that the basis for the 35 U.S.C. § 103(a) rejections has been removed.

As the independent claims are directed to novel subject matter, dependent claims are by definition also directed to novel subject matter and include all of the distinct elements of the independent claims. Applicant submits that claims 59, 67, and 78 are patentably distinguishable from Kramer in view of Fulton, thereby removing any basis for the 35 U.S.C. § 103(a) rejection.

#### 35 U.S.C. §103(a) Rejection – Kramer in view of Fulton and Hung

Claims 59, 61-67 and 69-81 were rejected under the provisions of 35 U.S.C. § 103(a), as allegedly being unpatentable over Kramer in view of Fulton, and further in view of Hung et al. (DE 3,539,195).

Applicant submits that neither Kramer alone or in combination with Fulton, if such combination was deemed proper, teach all of the features of the present claims. By combining Kramer with Fulton and Hung, if such combination was deemed proper, the combination of the three references would still not disclose the present invention. Hung, which has a catalyst with openings that can be elliptical or circular, does not disclose the use of a central opening, as described herein. Thus, neither Kramer, nor the combination of Kramer with Fulton or Kramer with Fulton and Hung disclose each feature of the present invention. As such, the references,

alone or in combination, do not disclose the present invention, which makes the present invention patentably distinguishable from the ceramic units of the cited references.

### **SUMMARY**

Kramer is missing at least one element of the present invention. No motivation exists to combine Kramer with Fulton or Kramer with Fulton and Hung. Even if the combination of the references were deemed proper, the combination does not disclose each element of the present invention.

In commenting upon the references and in order to facilitate a better understanding of the differences that are expressed in the claims, certain details of distinction between the references and the present invention have been mentioned, even though such differences do not appear in all of the claims. It is not intended by mentioning any such unclaimed distinctions to create any implied limitations in the claims. Not all of the distinctions between the prior art and Applicant's present invention have been made by Applicant. For the foregoing reasons, Applicant reserves the right to submit additional evidence showing the distinctions between Applicant's invention to be novel and nonobvious in view of the prior art.

The foregoing remarks are intended to assist the Examiner in examining the application and in the course of explanation may employ shortened or more specific or variant descriptions of some of the claim language. Such descriptions are not intended to limit the scope of the claims; the actual claim language should be considered in each case. Furthermore, the remarks are not to be considered to be exhaustive of the facets of the invention that render it patentable, being only examples of certain advantageous features and differences which Applicant's attorney chooses to mention at this time.

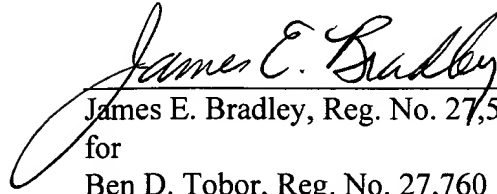
In view of the foregoing Amendment, Applicant respectfully submits that the presently presented claims are allowable, and Applicant respectfully requests the issuance of a Notice of Allowance.

The Commissioner is hereby authorized to charge all fees and any additional fees that may be required or credit any overpayment to Bracewell & Patterson, L.L.P. Deposit Account No. 50-0259 (Order No. 020781.004).



Date: February 17, 2005

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